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SCIENTIFIC PAPERS.

A REVISION OF THE AMERICAN SPECIES OF RUMEX OCCURRING NORTH OF MEXICO.

BY WILLIAM TRELEASE.

The following revision is based on a study of the material contained in the Engelmann, Bernhardi, and general herbaria of the Botanical Garden, and in the herbaria of Harvard University, the United States Department of Agriculture, Columbia College (including the Meisner herbarium), and the California Academy of Sciences, and the private collections of Capt. J. Donnell Smith, Dr. Chas. Mohr, Mr. W. M. Canby, Mr. I. C. Martindale, Prof. Jos. F. James, Mr. A. S. Hitchcock and Mr. H. J. Weber. Critical species, and material for the Garden herbarium, have also been contributed by many correspondents. My cordial thanks are hereby tendered all who have thus aided me; and I have particularly to thank Professor Areschoug of the Lund University, for the donation of a critical set of Scandinavian docks, especially rich in hybrids.

Rumex is a genus which has been held to include from 100 to about 130 species, the greater part of which belong to the north temperate region of both continents, though a considerable number occur south of the equator, and a few reach up into the Arctic regions. The principal monographs of the genus are by Campdera,* and Meisner.† For the general synonymy of our species, I have contented myself with references to the latter. Of the twenty-one

* Monographie des *Rumex*, Paris, 1819,— a paper which I have not seen.

† In De Candolle's *Prodromus*, xiv., Paris, 1856, 41. For other references see Bentham and Hooker, *Gen. Plant.* iii. 100.

species recognized by me as occurring within our flora, eleven were characterized and named by Linnæus in the first edition of the *Species Plantarum*, and only five have been named by American botanists. As a rule, though puzzling to the novice, they are well marked, and I have been able to complete my revision of the principal American material without seeing the necessity of designating any forms as new, though it may be that those mentioned under *salicifolius* and *crispus* will ultimately demand recognition as separate species. As illustrating the degree to which one so disposed may multiply species, it may be stated that in a very limited local flora (that of Lyon, France), Gandoger in 1875 (*fide* Just, iii, 685,) described sixteen new species, which other botanists are disposed to consider only forms or hybrids of familiar species. The practice of applying new specific names to known hybrids is also calculated to increase unwarrantably the enumerated species of a given region, since some of the docks and sorrels are known to hybridize quite freely.

One of our twenty-one species is merely a ballast introduction; seven others are Old World weeds; two (*Acetosa* and *salicifolius*) are apparently arctic-alpines of wide distribution, while the other eleven belong essentially to the North American flora.

Among the more important references to the specific delimitation of docks, aside from the monographs already referred to, should be noted: — Trimen, various papers in *Journal of Botany*, about 1873; Haussknecht, *Oesterr. Bot. Zeitschrift*, 1876, xxvi. (Just, 1876, part 2, 963 and 988), and *Mittheil. Geogr. Ges. f. Thüringen*, Jena, 1884, iii. 56–79 (Just, xii. part 2, 592), — where many hybrids are named; Murbeck, *Beitr. z. Kenntn. der Flora von Südbosnien u. d. Hercegovina*, in *Lunds Universitets Aarskrift*, 1891, xxvii.; and Rechinger, *Oesterr. Bot. Zeitschr.*, 1891, 400.

The chief biological interest in the genus comes from the protective acidity of the sorrels and some docks and the

occurrence of tannin and a bitter principle in others; their protandry and exclusive adaptation to wind pollination (*cf.* Müller's writings, and notes by Thomson in *Trans. Bot. Soc. Edinburgh*, xiv. 105, and Tulberg in *Bot. Notiser*, 1868, 12); and the adaptation of the greater number of species to wind dissemination, by the enlargement of the inner segments of the perianth during ripening, although some of those with fimbriate valves may profit by attachment to animals, while *R. Lappula* and *R. hamatus* form veritable burs, as Huth has shown in *Bibl. Bot.* 1887, No. 9, p. 13 (Just, xv. part 1,433). Causation of sex in the dioecious *R. Acetosella* is discussed by Hoffmann in *Bot. Zeitung*, xliii. Chatin describes the organogeny of the andrœcium in *Comptes Rend.* vol. 78, 254 (Just, 1874, 479). Herail considers the anatomy of the stem, in *Ann. des Sci. Nat.* 7 ser. ii. 283 and 286; and Hanstein describes the mucilage glands of the buds in some cases in *Bot. Zeit.* 1868, 699 and 799. The occurrence of tannin in considerable quantities is considered by Bandelier in *Verhandl. Gesellschaft. f. Erdkunde zu Berlin*, 1885, xii (Just, xiii. part 2, 234); and Borscow notes the presence of chrysophanic acid in the roots, in *Bot. Zeit.* 1874 (Just, ii, 126, 834). Other references concerning economic products and properties in the genus, — few species of which are of any considerable economic importance, — are given under the several species, particularly *R. hymenosepalus*, and the copious indexes of such pharmaceutical periodicals as the *American Journal of Pharmacy*.

SYNOPSIS OF NORTH AMERICAN SPECIES.

§ *Acetosella*. — Dioecious: inner segments of perianth without dorsal callosity, not reticulated, not larger than the achene: foliage acid. — Perennial.

1. *R. ACETOSELLA*, L. — A span to exceptionally a foot or two high, tufted, propagating by creeping roots; leaves rarely 5 cm. long, oblanceolate, acute, the lower mostly

hastate with a large decurrent rarely 1-toothed auricle on each side, the upper gradually reduced and entire; panicle more or less compound, usually reddish, the filiform ascending branches leafless; pedicels capillary, once or twice as long as the flower, articulated at summit; flowers about 1.5 mm. the outer sepals granular; achene four-fifths as broad as long. Sp. i. (1753), 338; Meisner, DC. Prod. xiv. 63.—Introduced from the Old World, a weed everywhere especially in dry poor soil.—Specimens examined from British America from Prince Edward's Island and Nova Scotia to Vancouver Island; and from Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Maryland, West Virginia, North Carolina, South Carolina, Florida, Mississippi, Louisiana, Ohio, Minnesota, Michigan, Wisconsin, Illinois, Missouri, Iowa, Kansas, Colorado, Texas, and California.—Plate 13.

§§ *Acetosa*.—Dioecious: inner segments of perianth (valves) rather finely reticulated, becoming round-cordate and much larger than the achene: foliage acid: inflorescence with slender leafless branches.—Perennial.

2. *R. HASTATULUS*, Baldw. — Tufted, mostly a foot or two high, leaves exceptionally 2.5x10 cm., oblong or oblanceolate, obtuse to subacute, some of them, especially on pistillate plants, hastate with a short and often broad spreading auricle on each side; panicle mostly ample and rather open; pedicels capillary, once or twice as long as the fruit, obscurely articulated below the middle; valves about 4 mm. in diameter, short clawed, sometimes slightly pointed, without callosities, the middle sometimes papillate; achene 1x1.5 mm.—Muhl. Cat. 2 ed. (1818), 37; Elliott, Sk. Bot. S. C. and Ga. i. (1821), 416; Watson, Bot. King. 314.—*R. Engelmanni*, Meisner, DC. Prod. xiv. 64.—Sandy bluffs and fields, Long Island to Florida, in the lower Mississippi Valley, and in Texas.—Specimens examined from Aquebogue, (*Young*, 1873), and Wading River, Long Island, (*Miller*, 1873, 1878), New Jersey, (*Smith*,

1890), North Carolina, South Carolina, Georgia, Florida, Alabama, Louisiana, Mississippi, Illinois, Missouri, Indian Territory, and Texas, one collection (*Hall*, 1872, 540 in various herbaria) with sublinear very hastate leaves.—Plate 14.

3. *R. GEYERI*, (Meisner).—Somewhat tufted, about a foot high; leaves exceptionally 3x9 cm., spatulate to lanceolate or the shortest somewhat elliptical-ovate, obtuse or acute, very gradually narrowed at base, neither auricled nor hastate; inflorescence rather simple, with suberect branches; pedicels about as long as the fruit, jointed toward the base; valves about 4 mm. in diameter, clawless, sometimes with a very minute rounded basal callosity; achene 1x2 mm.—*R. Engelmanni*, β *Geyeri*, Meisn. in DC. Prod. xiv. (1856) 64.—*R. paucifolius*, Nutt. Mss., Watson, Bot. King. (1871), 314.—Parks etc., in the mountains, from Wyoming and British America to Colorado, Utah, and California.—Specimens examined from N. Kootanie Pass, Brit. Amer. (*Dawson*, 1883), Montana (Flathead River, *Nuttall*), Wyoming (*Hayden*, 1860; *Parry*, 1873, 249; *Forwood*, 1881, 66), Yellowstone Park (*Letterman*, 1885; *Knowlton*, 1888), Colorado (North Park, *Sheldon*, 1884, 135), Utah (*Watson*, 1869, 1054; *Porter*, 1873), Idaho (*Hayden*, 1871), Washington (*Suksdorf*, 1883; *Bran-degee*, 1883, 1068), Oregon (*Geyer*, 488; *Lyll*, 1860; *Cronkhite*, 1864; *Cusick*, 1881, 984), and California (*Brewer*, 1863, 1696; *Lemmon*, 1874, 711; *Shockley*, 1886, 495).—Plate 15.

4. *R. ACETOSA*, L.—Simple, a foot or two high, frequently papillate about the nodes and on the midrib of leaves; leaves occasionally 4x10 cm., ovate or oblong-ovate, mostly obtuse, deeply cordate with commonly acute auricles, or subsagittate, a small tooth sometimes present on each auricle; inflorescence rather simple and compact; pedicels about as long as the fruit, conspicuously jointed in the middle; outer sepals of pistillate flowers relatively large,

reflexed even in flowering; valves orbicular, 5 mm. in diameter, clawless, usually with a delicate callosity at base; achene 1.2x2.5 mm. — Sp. i. (1753), 337; Meisner, DC. Prod. xiv, 64.— Apparently indigenous from Labrador to Lake Superior, Alaska, and Oregon; and introduced from the Old World at a few points in the Northern States probably as a waif from gardens, in which it is sometimes cultivated for its acid foliage. — Specimens examined from Labrador (*Bryant*, 1860), Toronto (*Macoun*, 1878) and Point aux Pins, Canada (*Macoun*, 1869, 84), N. Shore L. Superior (*Pitcher*), Quatcho Lake (*Dawson*, 1876), Morley (*Macoun*, 1885), and Arctic N. A. (*Richardson* on Franklin Exp.), Alaska (hb. Dep. Agr.), Vancouver Isl. (*Macoun*, 1887), Oregon (*Hall*, 1871, 442; *Howell*, 1882), Charlotte, Vt. (*Pringle*, 1877, 1879), Penn Yan, N. Y. (*Wright*), and Brookfield, Pa. (*Canby*, 1862).—Plate 16.

§§§ *Lapathum*.—Hermaphrodite or andro-monoecious: inner segments of perianth (valves) commonly reticulated, becoming round or elongated and much larger than the achene: leaves only exceptionally acid, never hastate: inflorescence with stouter sometimes leafy branches.— Perennial except *R. persicarioides* and *R. bucephalophorus*.

* Valves at most very minutely erose or low-denticulate.

+ Valves very large (15 to 50 mm. long), mostly rosy, round or broadly ovate, deeply cordate, without callosities: whorls rather remote but overlapping in fruit: outer sepals at length reflexed: stipular sheaths very large and loose.

5. *R. VENOSUS*, Pursh.— A span to mostly about a foot high (from deep-seated thin roots?), branching from most of the axils and spreading, glabrous; leaves firm, not wavy, at most 5x10 cm. elliptical or elliptical-ovate, abruptly acute at both ends; inflorescence nearly simple, leafless, the short zigzag branches divergent; pedicels rather stout, about as long as the fruit, tumidly jointed below the middle; valves rather firm, orbicular or broader than long, 20 to 50 mm. in diameter, the sinus often closed, emarginate to shortly blunt acuminate; achene 4x7 mm.— Fl. ii. (1814), 733; Meisner, DC. Prod. xiv.— Dry sandy soil in the plains

and foot hills, British Columbia to Oregon, Nevada, Dakota and Kansas. — Specimens examined from Qu'Appelle (*Macoun*, 1879, 192 and 1534) and Swift Current, in British America (*Macoun*, 1884); and from Washington (*Brandegee*, 1883, 1067; *Suksdorf*, 1886, 896), Oregon (*Spalding*; *Suckley*, 1855; *Lyall*, 1860; *Howell*, 1880 and 1881; *Cusick*, 1881, 983; *Henderson*, 1886, 103), Montana (*Hayden*, 1860; *Scribner*, 1883, 247; *Tweedy*, 1888, 104), Wyoming (*Hayden*, 1853-4), Dakota (*Hayden*, 1853; *Glatfelter*, 1865, 376; *Vasey*, 1868, 499; *Canby*, 1883, 278; *Manning*, 1884), Nevada, (*Anderson*, 1865, 243; *Watson*, 1868, 1048), Utah (*Hayden*, 1859; *Jones*, 1880, 1729), Colorado (*Hall and Harbour*, 1862, 495; *Parry*, 1867, 186; *Brandegee*, 1874; *Farwell*, 1890), and Kansas (*Damon*, 1888; *Kellerman*, 1889). — Plate 17. Young plants distributed from Oregon by Howell in 1885 may possibly belong here, possibly to *salicifolius*.

6. *R. HYMENOSEPALUS*, Torr. — One to three feet high, from a cluster of deep-seated Dahlia-like tuberous roots, subsimple, papillate to glabrous, often red; leaves rather succulent, more or less wavy margined, often 5x20 cm. or larger, elliptical to oblanceolate, obtuse to very sharply acuminate, the acute base decurrent on the short thick petioles; inflorescence ample, compound, with elongated suberect branches; pedicels slender, about as long as the fruit, less tumidly jointed below the middle; valves flexible, ovate, about 10x15 mm., obtuse to subacute, with an open sinus; achene 3x5.3 mm. — Bot. Mex. Bound. Surv. (1858), 177; Watson, Bot. Calif. ii. 8, 479; Parry, Amer. Nat. ix. 350; Greene, Am. Nat. xii. 175; Havard, Proc. Nat. Mus. 1885, 525; Vasey & Rose, Contr. Nat. Herb. i. 11; Brandegee, Pl. from Baja, 204; Rusby, Drug. Bull. Nov. 1890. — *R. Saxei*, Kell. Pac. Rur. Press, 1879; *R. Arizonicus*, Britt., Trans. N. Y. Acad. viii. (1888), 73. — Dry soil in the plains and lower mountains, California and Lower California to Utah, the Indian Territory, and Texas. — Specimens

examined from California (*Bigelow*, 1854; *Egloffstein*, 1854; *Brewer*, 1863, 405; *Bolander & Kellogg*, 1866; *Vasey*, 1880, 547, and 1881; *Mrs. Bush*, 1880; *Pringle*, 1882; *Parish*, 1882 & 1884, 678, 1888; *Brandege*, 1886; *Hasse*, 1888), Lower California (*Palmer*, 1889, 689, 829), Arizona (*Palmer*, 1867, 224; *Lemmon*, 1881, 281), Utah (*Mrs. Thompson*, 1872; *Parry*, 1874, 246; *Palmer*, 1877, 422; *Jones*, 1880, 1643), New Mexico (*Fendler*, 1847, 758; *Wright*, 1852, 1782; *Bandelier*, 1882; *Matthews*, 1883), Indian Territory (*Palmer*, 1868, 291), and Texas (*Thurber*, 1855, 140; *Reverchon*, 1882, 129).—Plate 18.

- + + Valves small or medium sized (not over 10 mm. long), only moderately if at all cordate.
- + + Valves round or very broadly ovate, flexible, low-reticulate: pedicels slender or capillary: stems glabrous except in *R. crispus*.

7. *R. OCCIDENTALIS*, S. Wats.— Mostly two or three feet high, erect or abruptly ascending, rather stout, subsimple; leaves somewhat fleshy, glabrous, glossy, bluish green, wavy margined, the lower ample or very large, ovate or mostly oblong-ovate, truncately cordate, the apex rounded to subacute; panicle strict, dense and rosy in fruit, naked or with few small leaves below; whorls somewhat remote but overlapping; pedicels 2 to 3 times as long as the fruit, very obscurely and not tumidly jointed below the middle; valves sometimes rosy, 5 to 6 mm. long (exceptionally 7x9 mm.) deltoid-ovate, often only slightly cordate, remotely erose or denticulate, rounded or obtuse at apex, without callosities (but one midrib occasionally somewhat thickened); achene 2 to 2.5x4 mm.—Proc. Amer. Acad. xii. (1876), 253.—*R. longifolius*, Meisner, DC. Prod. xiv. 44, as to the American plant and its synonyms.—Damp or rich soil, Labrador to Alaska, south to Canada, California, and in the mountains to Texas.—Specimens examined from Labrador (*Storer*; *Allen*, 1882, 64), Hudson's Bay (*Bell*, 1884), Arctic America (*Richardson* on Franklin Exp.), Canada (*Allen*, 1881; *Macoun*, 1883), Saskatchewan (*Bourgeau*, 1858) and

various points in British Columbia; and from Alaska (*Tiling*, 1867, 159; *Dall & Harrington*, 1872; *Nelson*, 1877; *The Albatross*, 1888, 2), Washington (*Suksdorf*, 1885, 604), Oregon (*Lyall*, 1858; *Howell*, 1877, 355, and 1880), California (*Blankinship*, 1891, *Mrs. Austin*, 1880), Idaho, (*Sandberg*, 1887), Montana (*Canby*, 1882), Nevada (*Watson*, 1868, 1049), Utah (*Ward*, 1875, 411), Colorado (*Hall & Harbour*, 1862, 158, 499; *Vasey*, 1868, 498; *Greene*, 1870, 352, and 1871, 548; *Engelmann*, 1874 and 1881; *Brandeggee*, 1877; *Trelease*, 1891), Arizona (*Lemmon*, 1882, 2879), New Mexico (*Fendler*, 1847, 759), and Texas (*Ravenel*, 1869, in hb. Dep. Agr.)—Related to *R. aquaticus*, L. (which was collected on ballast at Camden, N. J., in 1879 by Mr. Martindale).—Plate 19.

Var. NANUS (Hook.), *R. domesticus*, β . *nanus*, Hook., Bot. Bor. Amer. ii. (1840), 129, probably comprises the simpler and more dwarf purple-stemmed plants of north-west Arctic America and the adjacent islands, which have been variously referred to *domesticus*, *longifolius*, and *arcticus*. They have commonly rather thick and succulent stems and subelliptical leaves, but all that I have seen are too immature for satisfactory determination with my present knowledge of the genus.—Specimens referred here doubtfully:—*Wright*, on Ringgold and Rodgers Exped.; *Stejneger*, 1882, 12, and 1883, 50; *Dall*, 1872; *Muir*, 1881, 125 and 217 (the last from Siberia); *Murdoch*, 1883; and *Str. Corwin*, 1884.—A very similar plant in hb. California Academy from Golovnin Bay (*Yemans*, 1884).

8. *R. PATIENTIA*, L.—Usually about three feet high, erect, stout, subsimple; leaves acid, usually quite wavy, ample or the lowest very large, ovate-lanceolate and elliptical, acute, the base rounded or decurrently acute, the principal veins often slightly papillate below; panicle strict, very dense in fruit, with few small leaves; whorls compact and approximate; pedicels nearly twice as long as the fruit, tumidly jointed near the base or below the

middle; valves 5 to 8 mm. in diameter, orbicular or broader than long, conspicuously cordate, erose or obtusely low dentate below, round or bluntly short acuminate at apex; callosities solitary (exceptionally wanting or a second or third developed), globose, smooth, rarely 1 mm. long; achene 2x3.5 mm. — Sp. i. (1753), 333; Meisner, DC. Prod. xiv. 51. — Introduced along roadsides and in fields at various points in the Atlantic States, from Europe, where it is cultivated for its acid foliage; possibly escaped from German kitchen gardens in its American stations. — Specimens examined from Saskatchewan (*Macoun*, 1872, 1030), Ontario (*Macoun*, 1874), Vermont (*Jesup*, 1873), Massachusetts (*Hitchcock*, 1829; *Tuckerman*; *Jesup*), New York (*Howe*; *Brown*, 1879, on ballast), New Jersey (*Schrenk*, 1879, and *Martindale*, 1880, on ballast), Pennsylvania (*Martindale*, 1882), Wisconsin (*Trelease*, 1887), Iowa (*Hitchcock*), Kansas (*Kellerman*), and Utah (Jordan Valley, *Watson*, 1869, 1050), — the last named locality quite out of the usual range, but the plants scarcely anything else. — Plate 20.

9. *R. BRITANNICA*, L. — Three or four feet high, erect, stout, at length considerably branched; leaves glabrous, little undulate, ample or the lowest very large, elliptical to ovate lanceolate, decurrently rounded or commonly acute at base, the apex very gradually pointed; panicle few leaved, ample, rather dense in fruit; whorls rather dense, remote but at length overlapping; pedicels about twice as long as the fruit, very obscurely and not tumidly jointed toward the base; valves 4x4.5 to 5x6 mm., round ovate, scarcely cordate, remotely erose or low-denticulate, obtuse, their lower veins sometimes much thickened at base; callosities 3, subequal, broad and low, sometimes wrinkled on the sides, more than half as long; achene 1.7x3.5 mm. — Sp. i. (1753), 334; Gray. Proc. Amer. Acad. viii. 399. — *R. orbiculatus*, Gray, various editions of the Manual. — Swamps, New Brunswick to the Lakes, south to New Jersey, Illinois,

and Iowa.—Specimens examined from New Brunswick (*Chalmers*, 1876; *Fowler*, 1870, 1871, with valves evidently toothed and very unequal in the same panicle, some of them 8 mm. long), Prince Edward's Island (*Macoun*, 1888) and other points in Canada (*Macoun*, 1865, 1882, 1888), Maine (*Redfield*, 1889), New Hampshire (*Blake*, 1861), Massachusetts (*Boott*, 1864, 1866; *Robbins*; *Jesup*, 1872, 1876; Rhode Island (*Congdon*, 1873, 1878), Connecticut (*Eaton*; *Potter*), New York (*Torrey*; *Vasey*, 1882), New Jersey (*Austin*, 1861; *Britton*, 1887), Pennsylvania (*Wolle*, 1841, 47; *Garber*), Ohio (*Lea*, no. 10), Illinois (*Vasey*), Michigan (*Wright*, 1838; *Robbins*, 1863, 52), Minnesota (*Douglass*, 1891), Wisconsin (*Lapham*, 1843; *Pammel*, 1887), and Iowa (*Arthur*, 100; *Hitchcock*). — Plate 21.

10. *R. CRISPUS*, L.—A couple of feet high, erect, rather stout, simple, glabrous to slightly papillate, leaves bluish green, the petiole and principal veins papillate, very wavy margined, the lowest ample, elliptical to mostly oblong-lanceolate, rather obtuse, rounded or decurrently acutish at base; flowering branches rather strict, somewhat leafy; whorls dense and approximated; pedicels about one-half longer than the fruit, tumidly jointed near the base; valves 3 to 5 mm. long, round-ovate, barely cordate, rounded or with a broad blunt acumination, minutely erose or exceptionally broadly dentate below; callosities 3, subequal, or two smaller, often rosy, smooth, ovoid, reaching to the middle of the valve; achene 1.5x2.5 mm.—*Sp. i.* (1753), 335; *Meisner*, DC. *Prod.* xiv. 44.—Roadsides, pastures, etc., everywhere; introduced from Europe.—Specimens examined from various points in Canada, Maine, Massachusetts, New York, Delaware, Maryland, District of Columbia, Virginia, South Carolina, Alabama, Florida (*Chapman*), Mississippi, Louisiana, Indian Territory, Ohio, Illinois, Missouri, Michigan, Minnesota, Wisconsin, Iowa, Nebraska, Colorado, Utah (*Jones*, 1879, 1183), Wyoming?

(*Jones Exped.* 273), Idaho (*Sandberg*, 1887, 75), Vancouver Island (*Macoun*, 1887), and California. —Plate 22.

Slender Californian plants with crisp sub-papillate leaves, simple elongated panicles, and rather large valves, one of them with a callosity, referred here with some doubt, occur as follows in the Gray herbarium.—Monterey (*Brewer*, 1863, 694); Oakland? (*Brewer*, 1863, 2597); Cambria (*Palmer*, 1876, 460 in part, some of the specimens being *R. pulcher* in hb. Dept. Ag.), and San Bernardino (*Vasey*, 1880).

++ ++ Valves triangular-ovate to oblong, sometimes with a contracted apex.

= Pedicels long and slender but rigid, abruptly reflexed near the base then straight; valves rigid, with heavy veins, all of them with elongated wrinkled callosities: glabrous throughout.

11. *R. VERTICILLATUS*, L.—A couple of feet high from a cluster of short conical roots, erect or quickly ascending, or occasionally decumbent and rooting at the nodes; rather slender, subsimple; leaves not wavy, the lower sometimes 5x40 cm., lanceolate or mostly oblong lanceolate, gradually acute at each end; petioles spongy; inflorescence nearly leafless, with few ascending branches; whorls dense, very remote below; pedicels thrice as long as the fruit, tumidly jointed close to the base, gradually thickened toward the flower; valves 4x4 to 5 mm., deltoid to subhastately 3 lobed, more or less cuneate at base; callosities 1 mm. broad and as long as the valve exclusive of its apical lobe; achene 2x3.5 mm.—*Sp. i.* (1753), 334; *Meisner*, DC. *Prod.* xiv. 47.—Swamps, commonly close to the water, Canada to Florida, Texas and Iowa.—Specimens examined from Ontario (*Macoun*, 1877, 1540), Vermont (*Jesup*, 1873), Massachusetts (*Jesup*, 1875), New York (*Carey*, 1834; *Gray*; *Boott*, 1855; *Beck*; *Sartwell*), Pennsylvania (*Hb. Bernhardtii*), Delaware (*Canby*, 1866), Maryland, (*Smith*, 1879), Florida (*Rugel*, 1843; *Chapman*; *Deane*; *Saurman*, 1868; *Palmer*, 1874; *Keeler*; *Canby*, 1889),

Alabama (*Mohr*), Louisiana (*Lindheimer*, 1859; *Hale*), Texas (*Wright*; *Lindheimer*, 1843, 93), Ohio (*Riddell*, 1838), Indiana (*Canby*, 1862), Illinois, Michigan, (*Wright*), Wisconsin (*Hale*, 1861; *Douglas*), and Iowa.—Plate 23.

= = Pedicels shorter, arcuately recurved: valves more flexible and with lighter veins except in *Floridanus*, one or more of them with elongated callosities, except in forms of *altissimus*.

a. Stem often glaucous, especially in the second: leaves pale green, lanceolate, minutely crenulate-crisped, not undulate nor cordate: inflorescence nearly leafless.—Glabrous throughout.

12. *R. FLORIDANUS*, Meisner.—A couple of feet high, slender, simple or with a few suberect branches; leaves scarcely over 1.5x8 cm. (the lowest dying early), strongly crenulate, lanceolate, subacute; panicle leafless, simple, the few branches nearly erect; whorls very dense, the lower remote, the upper closely approximated; pedicels rather stout, once or twice as long as the fruit, in the former case concealed, tumidly jointed about the middle, apophysate next the flower; valves 3.5 to 4 mm. long, deltoid, slightly blunt-pointed, with rather heavy veins; callosities 3, subequal, less than 1 mm. broad, two-thirds as long as the valves, finely warty and somewhat wrinkled; achene 1.8 x 2.7 mm.—DC. Prod. xiv. (1856), 46.—Known to me only through specimens from New Orleans (*Joor*, 1885) and Pointe a la Hache, La. (*Langlois*, 1880, no. 135, 1884, and 1885, no. 96), but presumably extending along the Gulf coast to Florida, where the type was collected by Rugel.—Plate 24.

The inflorescence is suggestive of simple forms of the next species, but the leaves are more crenulate, and the fruiting valves are as heavily veined as in *verticillatus*, to which most of the material referred here by collectors apparently belongs.

13. *R. ALTISSIMUS*, Wood.—Two or three feet high from one or several long conical roots, rather slender,

scarcely clustered, with ascending branches at or after flowering; leaves as much as 7x20 cm., little crenulate, broadly lanceolate to ovate lanceolate, acute, mostly rounded at base; inflorescence with several or in large plants numerous rather divergent branches, at length congested; whorls dense, approximate; pedicels rather slender, about as long as the fruit, tumidly jointed toward or near the base, more conically thickened; valves 4x5 mm., deltoid, sub-acute; callosities 3, subequal (or occasionally one or none), white, wrinkled and pitted, 1 mm. wide and two-thirds as long as the valve; achene 1.8x3 mm.—Class Book, (1847?), 477; Gray, Proc. Amer. Acad. viii. 399.—*R. Britannica*, Meisner, DC. Prod. xiv. 47; Gray, Manual, editions prior to the 6th, not L. *fide* Gray. l. c.—Rich soil, especially near brooks, etc., Massachusetts and New York to Dakota, south to the District of Columbia, Nebraska, and Texas.—Specimens examined from Nahant, Mass. (*Oakes*, as *R. pallidus*, Bigelow), western New York (*Clinton*, 1864), Pennsylvania (*Porter*, 1857; *Garber*, 1868), Maryland (*Smith*, 1881), District of Columbia (*Ward*, 1876, 1879; *Mohr*, 1882), West Virginia (*Mertz*, 1877 and 1878), Ohio (*Frank*, 1835; *Lea*; *James*), Indiana (*ex hb. Wood.*), Illinois, Wisconsin, Dakota (*Geyer*, 1839, 143; *Hayden*, 1853; *Glatfelter*, 1865, 376 in part), Nebraska (*Webber*, 1886; *Holms*, 1889), Kentucky, Missouri, Iowa, Indian Territory, (*Butler*, 1877, 6), and Texas? (*Reverchon*, 1876; *Tweedy*, 1880; *Jermy*, 149). According to memoranda on a St. Louis specimen in the Meisner herbarium, Meisner regards this as the same as *R. Claytonii*, Campdera; but there is too much doubt concerning this point for me to displace the now established name given by Wood.—Plate 25.

14. *R. SALICIFOLIUS*, Weinm.—Habit and aspect of the preceding but more tufted and ascending; leaves rarely over 2.5 x 15 cm., lanceolate, often falcate, acute at both ends; pedicels scarcely equalling the fruit or a few in each

cluster longer, jointed near the base; valves 2 to 3 x 4 to 5 mm., triangular ovate, acute, more delicately veined; callosities variable in number, smooth or mostly pitted, often nearly as long as the valve, 1 mm. or more broad, leaving typically a very narrow margin on each side; achene 1.3 x 1.7 to 2.5 mm.—Flora, 1821, 28; Meisner, DC. Prod. xiv. 47.—Arctic America across to Alaska, south to New Hampshire, the Great Lakes, and in the mountains to Southern California and Mexico, where it closely approaches *R. Mexicanus*.—Specimens examined from various British American points between New Brunswick and Vancouver Island; Alaska (*Tiling*, 1867, 394); and Maine (*Boott*, 1861; *Rand*, 1888), New Hampshire (*Canby*, 1866), Ashland, Wisconsin (*Farwell*, 1887), Keweenaw Co., Mich. (*Farwell*, 1890), Western Missouri! (*Bush*, 1890), Washington, Oregon (*Hall*, 1871, 441; *Lyall*, 1858, 1860; *Howell*, 1882), California, Montana (*Scribner*, 1883, 246), Idaho, Wyoming (*Forwood*, 1882, 177), Colorado, Utah (*Ward*, 1875, 540; *Palmer*, 1877, 421), New Mexico (*Fendler*, 1847, 760 and 761; *Rusby*, 1880), Arizona (*Coues and Palmer*, 1865), Nevada (*Watson*, 1868, 1051), Texas (*Merrill*, 1886), and Lower California (*Orcutt*, 1884).—Plate 26.

As here accepted, this species comprises several forms so far as the fruiting valves and achenia are concerned. The Asiatic form is said to have only one or two of the valves with callosity. In this respect two principal American forms may be distinguished:—*a*, with valves deltoid or abruptly acuminate, often evidently denticulate below, the margin conspicuous on either side of the frequently solitary callosity; *b*, with valves more narrowly triangular, nearly or quite entire, nearly concealed by the mostly 3 large callosities. The first in its more toothed form is var. *denticulatus*, Torr. Bot. Mex. Bound. (1859), 178. The second in its most pronounced form is var. *angustifolius*, Ledebour, Fl. Ross. iii. (1849), 504. It may be that these forms will bear separation, even from the Old World type; but the (frequently young) specimens in herbaria

show so many intermediate forms and admit of so poor a geographical delimitation, that I cannot find good grounds for recognizing more than a single species.

A more zigzag plant with broad elliptical rather firm leaves (3 x 8 cm.) and one valve almost covered by the very large callosity (1.5 to 2 x 3 to 4 mm.), the other two naked, occurs from Sta. Cruz Mountains (*Kellogg & McLean*, 1876, 597), Sta. Lucia Mountains (*Brandege*, 1885), and about San Francisco, Cal. (*Vasey*, 1880, 545; *Mrs. Brandege*, 1882; *Blankinship*, 1891). Others may consider this to be clearly distinct, but I leave it here for the present. *Kellogg & Harford*, 1868, 867, judging from a fragment in hb. Gray., may be the same.

- b. Not glaucous: leaves mostly darker green, the lower broadly ovate or widest above the middle, undulate, sometimes cordate or abruptly rounded at base: inflorescence lax. — Plants two or three feet high.

15. *R. BERLANDIERI*, Meisner. — Erect or quickly ascending, glabrous to somewhat papillate; stem rather stout and succulent, mostly reddish, subsimple, zigzag above; leaves becoming 4 x 20 cm., spatulate to oblanceolate, obtuse; panicles terminal and axillary, leafless except for the main axis, the branches divergent or ascending; whorls dense, remote except above; pedicels rather stout, about as long as the fruit, tumidly jointed below the middle; valves 2.5 to 3 x 3 to 4 mm., subtriangular, erose or mostly with three or four very evident teeth on each side towards the base; callosities mostly 3, oblong, wrinkled on the sides below, unequal, the larger .7 mm. wide, extending beyond the middle of the valve; achene 1 x 2.3 mm. — DC. Prod. xiv. (1856), 45. — Arizona and New Mexico through Texas to Mexico. — Specimens examined from Arizona (*Palmer*, 1876, 638; *Evans*, 1891), New Mexico (*Wright*, 1851, 1781; 1852, 347, 1780), Texas (*Bound. Surv.* 1173; *Lindheimer*, 1843; *Vasey*, 1881; *Havard*, 1881, 111; *Miss Croft*, 115), and Mexico (*Mercier*, 1828, 115; *Berlandier*, 885, and 1831, 2315; *Palmer*, 1880, 1182). — Plate 27.

16. *R. CONGLOMERATUS*, Murray. — Mostly clustered, slender stemmed, glabrous; leaves not over 5 x 10 cm., ovate or mostly oblong, frequently somewhat fiddle shaped, obtuse; flowering branches slender, at length elongated; not zigzag, ascending, bearing a broadly lanceolate leaf at nearly every node; whorls dense, very remote except at ends of branches; pedicels rather slender, about as long as the fruit, tumidly jointed near the base; valves 1.5 x 2.5 mm., nearly oblong, obtuse; callosities mostly 3, round to ovoid, very prominent, smooth except for the sides below, where they pass into the larger veins, half as long and nearly as wide as the valves; achene 1.5 x 2 mm. — Prod. Fl. Goetting. (1770), 52; Meisner, DC. Prod. xiv. 49. — A European plant introduced sparingly along the Atlantic Coast, and abundantly in California. — Specimens examined from Virginia (*Curtiss*, 1872; *Dep. Agr.*, 1878), South Carolina (*Ravenel*), and various parts of California (*Palmer*, 1875; *Rothrock*, 1875, 64; *Parry* and *Lemmon* 1876, 372; *Greene*, 1876, 970; *Hooker* and *Gray*, 1877; *Nevin*, 1878; *James*, 1879; *Vasey*, 1880, 546; *Mrs. Brandegee*, 1891; *Blankinship*, 1891), — and ballast at New York (*Brown*, 1879, 12). — Plate 28.

R. SANGUINEUS, L. — Habit and general appearance of the last, but the slender flowering branches leafless, and one only of the valves with a large round callosity; veins of leaves, etc., typically very red. — Sp. i. (1753), 334; Meisner, DC. Prod. 49. — An occasional waif in the Atlantic region, seen by me only from ballast at Philadelphia (*Martindale*, 1880). — A form destitute of the red veining (var. *viridis*, Smith) from Tuscaloosa, Ala. (*Smith*, 1876), and on ballast near Philadelphia (*Martindale*, 1878), and at N. Y. City (*Brown*, 1879, 15).

This species was described by Linnæus as from “Virginia,” but there is little doubt that it is a native of Europe. What has frequently passed for it in this country is the red-veined variety of *R. obtusifolius*, which is readily

recognized from its large ovate leaves not at all constricted above the base, and its large strongly toothed valves, much longer than the callosity.

** Valves very prominently toothed.

17. *R. PULCHER*, L.—A couple of feet high; stem rather slender but firm, zigzag above, branching at nearly every node or at length dichotomous above, mostly glabrous; leaves not over 5x12 cm., minutely crenulate crisped, fiddle shaped, cordate, obtuse to acute, the petiole and one or both surfaces of the principal veins mostly very papillate or subvillous; flowering branches simple, divaricate, all but their lowest leaves very small; whorls dense but remote; pedicels very stout, scarcely larger than the fruit, tumidly jointed in the middle; valves rigid, one commonly larger than the others, heavily veined, 3 to 4x5 mm., ovate, obtuse, with 5 to 10 stout teeth on each side, the short apex more or less erose; callosities frequently solitary, 1 mm. broad, half as long as the valve, wrinkled and often crested; achene 1.5x2.5 mm.—*Sp. i.* (1753), 336.—From the Mediterranean region, introduced in dry ground along the Atlantic Coast, especially southwardly, and on the Pacific slope.—Specimens examined from Virginia (*Morong*, 1877; *Seaman*, 1877; *Chickering*, 1878; *Vasey*, 1878, 421), Charleston, S. C. (*Hexamer* and *Maier*, 1855, 22), Mobile, Ala. (*Mohr*, 1871, 1890), Florida (*Chapman*), Pointe à la Hache, La. (*Langlois*, 1883), Nevada (*Engelmann*, 1880), Oregon (*Howell*, 1887, 712), and California (*Torrey*, 1865, 422; *Palmer*, 1876, 460 in part; *Hilgard*, 1891; *Blankinship*, 1891). Ballast specimens also from New York (*Brown*) and Camden, N. J. (*Parker*, 1879; *Martindale*, 1879, 1880.) — Plate 29.

18. *R. OBTUSIFOLIUS*, L.—Two or three feet high, erect; stem usually and sometimes strongly papillate; leaves somewhat undulate, ample or the lowest very large, broadly ovate, cordate, frequently acute, the often purple veins papillate, especially beneath; flowering branches sub-erect,

sparingly leafy below; lower whorls loose and rather remote; pedicels slender, about twice as long as the fruit, tumidly jointed toward the base, valves flexible, not very heavily veined, 2 to 3x4 to 5 mm., ovate-oblong, with 3 to 5 thin triangular teeth on each side, mostly confined to the lower half or two-thirds, the triangular entire apex mostly acute; callosities smooth, ovoid, scarcely reaching the middle of the valve, the largest one about 1 mm. broad, the other two usually very small; achene 1.3x2.2 mm.— Sp. i. (1753), 335; Meisner, DC. Prod. xiv. 53.— Roadsides, pastures, etc., everywhere in the East; introduced from Europe.— Specimens examined from points in Canada, Maine, Massachusetts, New York, New Jersey, Delaware, District of Columbia, Virginia, North Carolina, Florida, Louisiana, Pennsylvania, Ohio, Michigan, Wisconsin, Illinois, Tennessee, Iowa, Missouri, Kansas, Idaho, Arkansas (*Bigelow* on Whipple's Exped.), Texas, (*Reverchon*, 1874), Oregon (*Kellogg* and *Harford*, 1869, 869). — Plate 30.

Var. DISCOLOR, Wallroth, with the stem purple and the leaves very red veined, like beet leaves, is only an extreme color form often not distinguishable in herbarium specimens. What is probably that, examined from Nova Scotia (*Macoun*, 1883), Vancouver Island (*Macoun*, 1887) and California (*Kellogg*, 1866). This appears to comprise the greater part of the *R. sanguineus* of American collectors.

A hybrid of *obtusifolius* with *crispus* occurs quite frequently about St. Louis (*cf.* Meisner, DC. Prod. xiv, 54), intermingled with the parent forms or in the vicinity of one or the other. From the first, it differs in the decided blue green color of the leaves, the somewhat greater undulation of their margin, and the narrower outline of all but the lowermost, and in its variable fruiting valves being of unequal size, often broader than long, the lower two-thirds abruptly dilated and with 4 to 5 short acute teeth on each side, often unequally grown together, the three valves bearing prominent callosities. From *crispus* it differs in the more compound and lax panicle, broader lower leaves, and

deltoid or almost 3-lobed sharply toothed valves. It is found also in other localities, and may usually be recognized from a distance owing to the ragged appearance of the inflorescence, only a small percentage of the flowers enlarging (and fewer yet developing seed), so that the fruiting valves appear abnormally large by contrast, while they persist after the falling of the undeveloped flowers.

So far as I can determine, this is *R. acutus*, L. = *R. pratensis*, M. & K., which occurs throughout northern Europe (where it is often sterile), and is now generally admitted to be a hybrid of the two species named. Related but distinguishable hybrids are the Scandinavian *R. conspersus*, Hornem., *R. platyphyllos*, F. W. Aresch., and *R. propinquus*, J. E. Areschoug, — on all of which see F. W. Areschoug in Öfvers. K. Vet. Akad. Förh., 1862, 57–76 with plate 3. American specimens have been examined from numerous localities in and about St. Louis, Mo., Belleville, Ill., North Manitou Isl., L. Mich. (*Mrs. Wislizenus*), Ithaca, N. Y. (*Dudley*, 1883, 114), Amherst, Mass. (*Jesup*, 1871), and Washington, D. C. (*Ward*, 1884).— Plate 31.

19. *R. PERSICARIOIDES*, L. — Annual, a span to mostly a couple of feet high, slender to thick but soft stemmed, the larger plants branching from the base and often prostrate and rooting at the nodes, soon fistulous, subglabrous to mostly papillate-villous; leaves pale green, usually undulate, the largest 3x18 cm., lanceolate, mostly acute, the base commonly truncate, rounded or subcordate, papillate beneath on the principal veins; panicles leafy, axillary and terminal, the very dense whorls crowded to quite remote; pedicels capillary, scarcely twice as long as the fruit, tumidly jointed at base; valves 1.5x2.5 mm., equalled in length by the 2 or 3 bristle-form teeth on each side, the apex acutely produced but not bristle tipped; callosities 3, subequal, smooth, .3 to .4 mm. broad, compressed from the sides, nearly as long as the body of the valve; achene .6x1.2 mm.— Sp. i. (1753), 335. — *R. maritimus* of most recent

writers on American botany. — Wet sand along the sea-coast of the northern Atlantic States, about salt springs at various points in the interior, and on river banks, beaches, etc., across British America, extending southward to Illinois, southern California and Mexico. — Specimens examined from various points in British America, and from Massachusetts, Rhode Island, New Jersey, Wisconsin, Illinois, Iowa, Nebraska, Dakota, Montana, Idaho, Yellowstone Park, Colorado, New Mexico, Nevada, California, Oregon and Washington. — Plate 32.

The usual form, with narrow collosities and much elongated bristles, differs from the European *R. maritimus* only in the frequent wavy margin and obtuse base of the leaves and the occasional development of a third bristle on each side of the valves; and a few sea-shore specimens apparently belong to the normal form of the latter. If it is kept apart from the European plant, it must bear the name here employed, and I am inclined to think that it is as distinct as most Old World species of the *maritimus* group. But in any event, if precedence on a given page is held to establish the priority of one name over another, *persicarioides* has precedence over *maritimus*.

R. crispatus, Michx., Fl. i. (1803), 217, is the form with broadest most wavy leaves, more naked inflorescence, and larger valves, only two of them bearing unequal callosities; but a study of the many forms growing intermingled about St. Louis, has not shown the wisdom of maintaining it even as a variety.

A specimen from Washington (*Suksdorf*, 1889, 943), has nearly entire valves, but the usual form occurs under the same number; and a very similar plant is *R. salicifolius*, var. (?) of Watson, Bot. King. 314, from Nevada (*Watson*, 1868, 1052).

R. BUCEPHALOPHORUS, L. — Annual, a span or two high, spreading, slender, simple or with few subequal branches, glabrous and apparently somewhat glaucous; leaves scarcely

1.5x2 cm., rhombic ovate to oblanceolate, obtuse to acute, cuneate, not wavy, reduced and ultimately obsolete on the branches; flowers in the upper axils, forming slender spike-like racemes, few in a whorl; pedicels once or twice as long as the fruit, at length much dilated and involute above so as to appear clavate, jointed below the middle, frequently papillate; outer sepals rather large, reflexed or arcuately spreading; valves 1x2 mm., somewhat 3-nerved, with a few transverse veins, acute or acutish, with about 3 broad hooked teeth on each side; callosities 3, minute, basal, acute margined; achene .7x1.3 mm.—Sp. i. (1753), 336; Steinheil, Ann. Sc. Nat. 2 ser. ix. 193, pl. 7; Meisner, DC. Prod. xiv. 62.—A Mediterranean species of somewhat the habit of *Acetosa*, represented by a single collection from Louisiana (Port Eads, May 6, 1885, *Langlois*, no. 95 and 134). — Plate 33.

EXPLANATION OF PLATES ILLUSTRATING THE NORTH
AMERICAN SPECIES OF RUMEX.

The figures were drawn, under supervision of the author, by Mrs. J. C. Duffey and Miss Grace E. Johnson, whose signatures indicate the plates drawn by each. Nos. 13, 14, 22, 23, 25, 28, 30, 31 and 32 are from living plants; the remainder, from herbarium specimens. Illustrations of fruit are from drawings by the author.

Plate 13, *R. Acetosella* L.—Rather large plant, reduced to half size; and fruit, inclosed in calyx, x 8.

Plate 14, *R. hastatulus*, Baldw.—Staminate and pistillate plants, half size; fruiting branch, natural size; fruit, x 4; achenium, x 8.

Plate 15, *R. Geyeri* (Meisn.).—Staminate and pistillate plants, one-sixth size; leaves and fruiting branch, natural size; fruit, x 4; achenium, x 8.

Plate 16, *R. Acetosa*, L.—Staminate and pistillate plants, one-sixth size; leaf and fruiting branch, natural size; fruit, x 4; achenium, x 8.

Plate 17, *R. venosus*, Psh.—Habit, one-sixth size; leaves and fruit, natural size; achenium, x 8.

Plate 18, *R. hymenosepalus*, Torr.—Roots and habit, one-sixth size; leaf, half size; fruit, natural size; achenium, x 8.

Plate 19, *R. occidentalis*, Wats.—Habit, one-sixth size; leaf, half size; fruiting branch, natural size; achenium, x 8.

Plate 20, *R. Patientia*, L.—Habit, one-sixth size; leaf, half size; fruiting branch, natural size; achenium, x 8.

Plate 21, *R. Britannica*, L.—Habit, one-sixth size; leaf, half size; fruiting branch, natural size; fruit, x 4; achenium, x 8.

Plate 22, *R. crispus*, L.—Habit, one-sixth size; leaf,

half size ; fruiting branch, natural size ; fruit, x 4 ; achenium, x 8.

Plate 23, *R. verticillatus*, L. — Habit, one-sixth size ; root and leaf, half size ; fruiting branch, natural size ; fruit, x 4 ; achenium, x 8.

Plate 24, *R. Floridanus*, Meisn. — Habit, one-sixth size ; leaves, natural size ; fruit and achenium, x 8.

Plate 25, *R. altissimus*, Wood. — Habit, one-sixth size ; leaf, half size ; fruiting branch, natural size ; achenium, x 8.

Plate 26, *R. salicifolius*, Weinm. — Habit sketches, one-sixth size ; leaf, half size ; fruiting branch, natural size ; two fruits and achenium, x 8.

Plate 27, *R. Berlandieri*, Meisn. — Habit, one-sixth size ; leaves, half size ; fruiting branch, natural size ; fruit and achenium, x 8.

Plate 28, *R. conglomeratus*, Murr. — Young plant, one-sixth size (the branches become much more elongated and spreading) ; leaf, half size ; fruiting branch, natural size ; fruit and achenium, x 8.

Plate 29, *R. pulcher*, L. — Habit of young and old plants, one-sixth size ; leaves, half size ; fruiting branch, natural size ; fruit and achenium, x 8.

Plate 30, *R. obtusifolius*, L. — Habit, one-sixth size ; leaf, half size ; fruiting branch, natural size ; fruit and achenium, x 8.

Plate 31, *R. crispus* x *obtusifolius* (*R. acutus*, L). — Habit, one-sixth size ; leaf, half size ; fruiting branch, natural size ; two fruits, x 4.

Plate 32, *R. persicarioides*, L. — Habit, one-sixth size ; leaf, half size ; fruiting branch, natural size ; fruit and achenium, x 8.

Plate 33, *R. bucephalophorus*, L. — Habit, half size ; leaves and fruiting branch, natural size ; fruit and achenium, x 8.

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RUMEX ACETOSELLA.



RUMEX HASTATULUS.



RUMEX GEYERI.



RUMEX ACETOSA.



RUMEX VENOSUS.



RUMEX HYMENOSEPALUS.



RUMEX OCCIDENTALIS



RUMEX PATIENTIA.



RUMEX BRITANNICA.



RUMEX CRISPUS.



RUMEX VERTICILLATUS.



RUMEX FLORIDANUS.



RUMEX ALTISSIMUS.



RUMEX SALICIFOLIUS.



RUMEX BERLANDIERI.



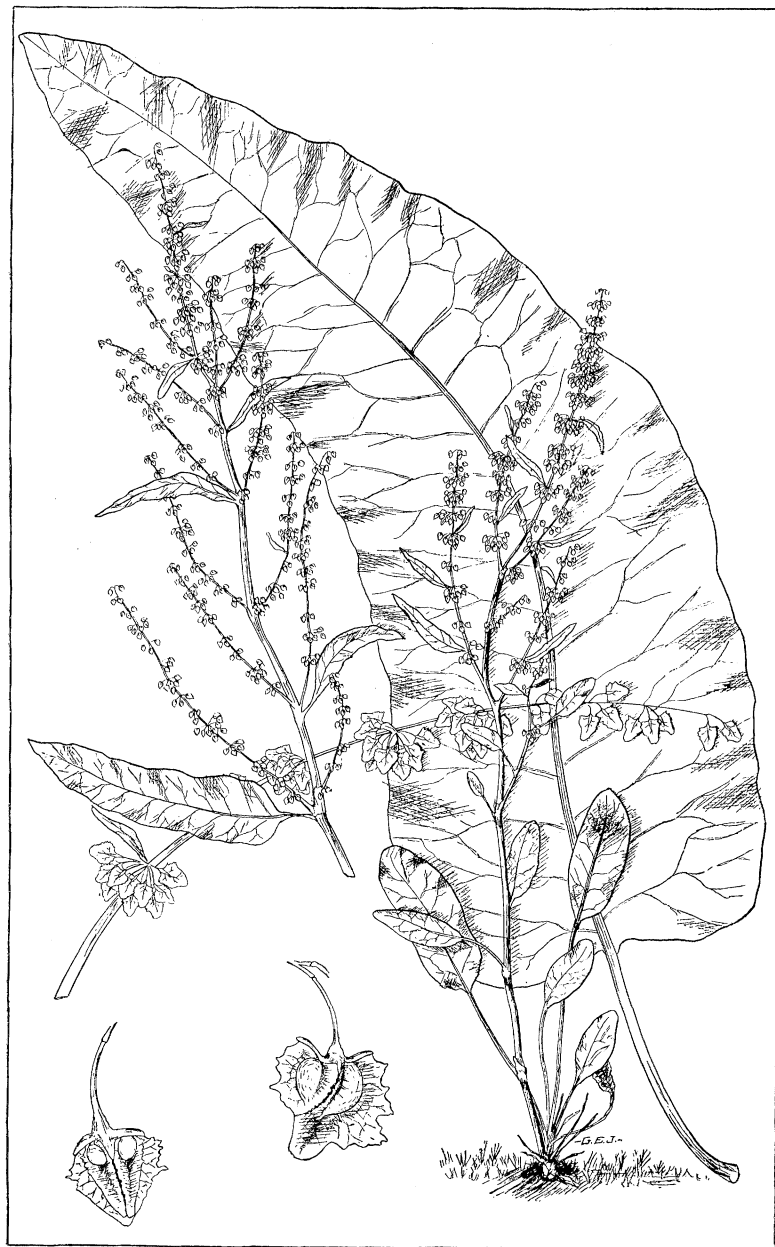
RUMEX CONGLOMERATUS.



RUMEX PULCHER.



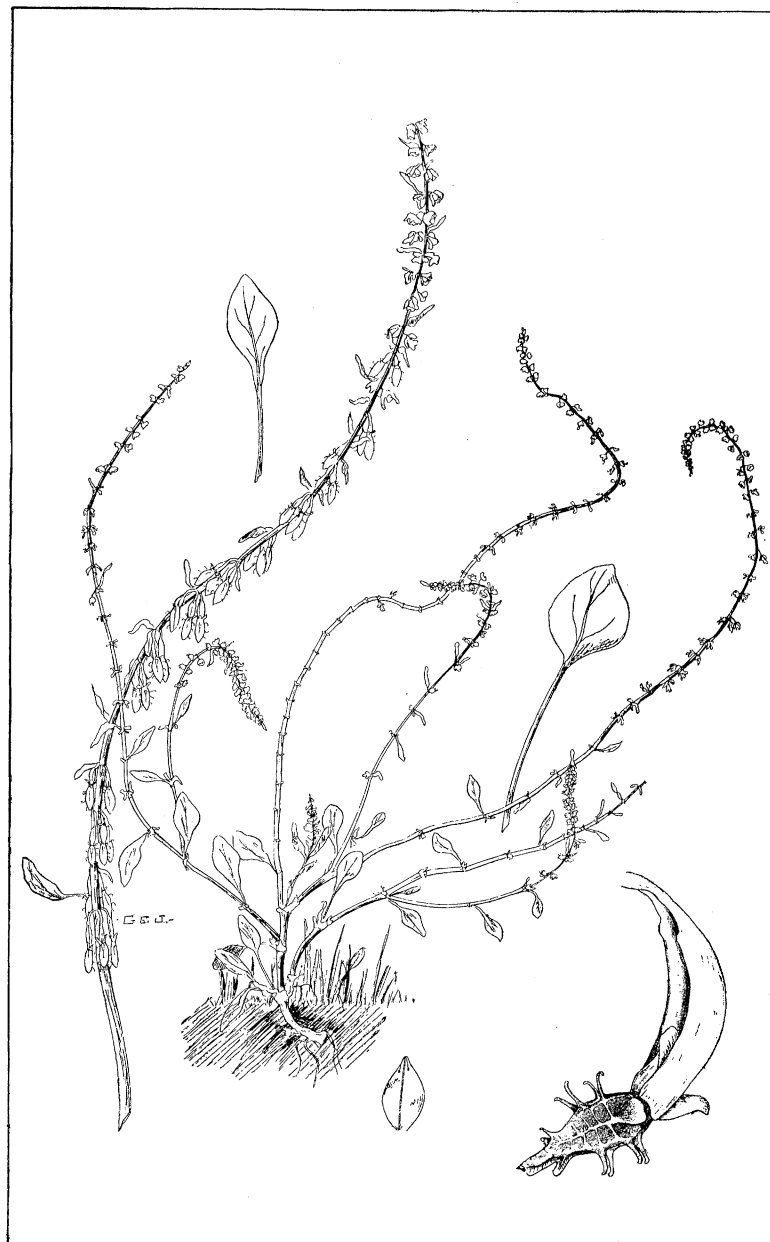
RUMEX OBTUSIFOLIUS.



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RUMEX PERSICARIOIDES.



RUMEX BUCEPHALOPHORUS.